§ 15.407   Maximum Permissible Exposure

Test Requirement(s):   **§15.407: D**evices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment.

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit: EUT's operating frequencies BLE @ 2402 – 2480, WiFi @2412 – 2462, UNII-1 @ 5180 – 5240 and UNII-3 @ 5740 - 5835; **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{(PG / 4\pi S)}$$

where, S = Power Density (mW/cm^2)
       P = Power Input to antenna (mW)
       G = Antenna Gain (numeric value)
       R = Distance (cm)

Test Results:

FCC									
Frequency (MHz)	Con. Pwr. (dBm)	Con. Pwr. (mW)	Ant. Gain (dBi)	Ant. Gain numeric	Pwr. Density (mW/cm^2)	Limit (mW/cm^2)	Margin	Distance (cm)	Result
5240	17.1	51.29	5.2	3.31	0.034	1.0	-0.966	20	Pass
5745	17.6	57.54	5.2	3.31	0.038	1.0	-0.962	20	Pass
2437	16.5	44.67	4.7	2.95	0.026	1.0	-0.974	20	Pass
2402	-1.0	0.79	2.7	1.89	0.001	1.0	-0.999	20	Pass

With simultaneous transmission of the Bluetooth LE and the Wi-Fi transmitters the worst-case power density is 0.1 with a degree of margin of -0.9.

The safe distance for SWX-UTC where Power Density is less than the MPE Limit listed above was found to be 20 cm.